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PARADIGM FOUND – THE NUCLEAR AND NONLINEAR BATTLEFIELDS

A Monograph
by
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Infantry

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

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Paradigm Found: The Nuclear and Nonlinear Battlefields

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MONOGRAPH APPROVAL

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ABSTRACT

PARADIGM FOUND - THE NUCLEAR AND NONLINEAR BATTLEFIELDS by MAJ J. Marc LeGare, USA, 50 pages.

This monograph explores the similarity between the nuclear battlefield of the Pentomic Era and the nonlinear battlefield described in TRADOC Pamphlet 525-5 AirLand Operations: A Concept for the Evolution of AirLand Battle for the Strategic Army of the 1990's and Beyond. This concept is based on the assumption that future battlefields will be nonlinear (more open, less dense). Since the ideas in this pamphlet will guide developments in doctrine, organization, training, materiel, and leader and soldier development, examining this nonlinear battlefield is important. Many aspects of the Pentomic Era's nuclear battlefield are similar to the nonlinear battlefield. If a strong enough connection can be made between the two, some of the nuclear battlefield's testing and analysis data could be used to guide future nonlinear battlefield analysis.

The methodology used for objectively determining similarity between the two battlefields is based on comparing the nonlinear battlefield described in TRADOC Pamphlet 525-5 to the nuclear battlefield described in various Pentomic Era books, articles, and studies. The test criteria are: battlefield characteristics (descriptive aspects which set the battlefield apart from preceding descriptions); battlefield relationships (relationships between activities, friendly and enemy forces, and combat and sustainment forces); and combat power dynamics (from FM 100-5 Operations - maneuver, firepower, protection, and leadership).

Additionally, the Soviet view of the nonlinear/nuclear battlefield relationship is discussed as further evidence linking the two battlefield descriptions. Finally, the monograph ends with comments on the utility of studying military history.

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> We visualize the battlefield, thousands of square miles in extent...troops are widely dispersed in order to minimize the effect of enemy tactical nuclear weapons, yet they must be capable of swift concentration to provide an overwhelming assault force for the full exploitation of our own tremendous firepower.
>
> William M. Brucker
> Secretary of the Army
> Military Review, Jan 1958

> These trends (arms control and cost of maintaining modern armies) result in battlefields which are becoming less dense and increasingly dominated by the precision of technology and mobility. Fewer forces and the vulnerability of massed forces will make the battlefield increasingly nonlinear.
>
> TRADOC Pamphlet 525-5
> Aug 1991

INTRODUCTION

The first quotation described the "nuclear battlefield" expected during the Pentomic Era (1954-1960).[1] The Pentomic Era derived its name from the distinctive five-maneuver element organizations designed to operate on the tactical nuclear battlefield. The second quotation was taken from Training and Doctrine Command (TRADOC) Pamphlet 525-5 and describes the nonlinear battlefield envisioned for the 1990's.[2]

TRADOC Pamphlet 525-5 AirLand Operations - A Concept for the Evolution of AirLand Battle for the Strategic Army of the 1990's and Beyond, is TRADOC's vision for how the US Army ought to fight. This

pamphlet sets a "general azimuth" for the evolution of doctrine, organization, training, materiel, and leader and soldier development.[3] Leaving aside arguments about concepts or doctrine as "engines of change," this pamphlet is important because it gives direction to today's combat developers on the future of the US Army. How the US Army views this future nonlinear battlefield will affect how it fights.

But is this nonlinear battlefield really new? A ursory literature review reveals that the Army leadership of the 1950's wrestled with many of the same battlefield issues that TRADOC Pamphlet 525-5 discusses. This monograph explores the following question: Is the nuclear battlefield of the Pentomic Era similar to the nonlinear battlefield postulated in TRADOC Pamphlet 525-5? The operative word in this discussion is "similar." By "similar" I mean to show that any differences that arise are differences in degree rather than kind. If they are similar, today's combat developers could gain valuable insights and efficiencies from analysis and testing conducted nearly forty years ago.

SCOPE AND METHODOLOGY

This study uses TRADOC Pamphlet 525-5 as a basis for the nonlinear battlefield description. It also uses

unpublished documents that TRADOC writers used to develop their pamphlet. I drew nuclear battlefield literature from professional journals, books, US Army field manuals, and unclassified government studies.

Just as TRADOC Pamphlet 525-5 limits the nonlinear battlefield to warfighting, this paper also focuses on warfighting. Therefore it does not address low intensity conflict (LIC) in any of its forms (insurgencies, anti-drug operations, peacekeeping, to mention a few) in the battlefield description.

I will apply a compare and contrast methodology to arrive at an objective answer to the research question. I will describe the nuclear and nonlinear battlefields. Then I will compare and contrast both descriptions using three test criteria. These criteria will provide the tool for determining whether or not the battlefield descriptions are in fact similar. The first criterion is *battlefield characteristics* and contains key descriptive aspects found in the literature describing both battlefields. By analyzing descriptive words common to both concepts, I will determine differences in quality or substance.

The second criterion is *battlefield relationships*. These relationships describe the interaction between and among battlefield activities and forces. These relationships give insight to how Army leaders

understood interactions between battlefield activities, enemy and friendly forces, and combat and sustainment forces.

The final test criterion is *combat power dynamics*. Combat Power Dynamics are the four main functions that contribute to combat power on the battlefield. These dynamics are useful for analyzing differences that occur over time.

Other criteria I considered were: battlefield operating systems, forms of maneuver, types of defense, and battlefield framework (close, deep, rear, security, and reserve). These were discarded because they did not provide the level of resolution sufficient to reach an answer to the research question.

After analyzing the test criteria, I will then address the counter-argument and briefly discuss the Soviet/Russian view on the similarity of the two battlefields. This paper concludes with a discussion of the enduring, professional value of studying military history and the nuclear battlefield issues that relate to the nonlinear battlefield.

I. BATTLEFIELD DESCRIPTIONS

Both battlefield explanations will follow the same format: factors causing change, battlefield description, aspects which caused concern to Army leaders, and requirements necessary for successful operations.

The Nuclear Battlefield

The Pentomic Era was a challenging period for Army leaders. Technology had increased firepower a thousand-fold without a requisite increase in mobility, protection, or communications. Pentomic Era authors were divided about how the battlefield would change. F. O. Miksche, Atomic Weapons and Armies, thought that tactical nuclear weapons would drive tactics back to linear, positional warfare. On the other hand, others believed that no change would occur. These people believed that tactical nuclear weapons increased the quality of fire support and no tactics change was needed.

Factors Causing Change

Tactical nuclear weapons of the 1950's were the dominant influence on battlefield planning. There was no historical precedent for weapons of such destruction and senior army commanders felt that efforts to survive

tactical nuclear strikes would significantly influence doctrine and tactics.[4] The prospect of fighting battles with nuclear weapons alone even brought into question the US Army's existence as land combat force. Some US Army leaders thought the Army might be relegated to providing base security for US Air Force strategic bombers.[5] Army leaders had to describe this new battlefield and how it could survive, operate, and contribute to safeguarding national interests.

Battlefield Description

Potential nuclear lethality brought about a battlefield characterized by dispersion, mobility, autonomy, and flexibility.[6] Dispersion brought a degree of protection to units on the nuclear battlefield. By dispersing laterally and in depth, units could reduce their signature and therefore, the enemy's ability to acquire them. At the same time, dispersion reduced the overall vulnerability of these units to nuclear strikes. Higher headquarters dispersed their subordinate units so that any single nuclear strike would not render the entire organization combat ineffective. But protection via dispersion came at a price.

Any dispersed force needed increased mobility to react to enemy penetrations or to exploit friendly

nuclear strikes. If the enemy penetrated the defense to any significant depth, friendly dispersed units would have to rapidly move along separate routes to converge on the enemy and destroy him. Likewise in the offense, dispersed units would have to both remain undiscernible to enemy target acquisition means and at once be able to appear and move through areas struck by our tactical nuclear weapons.

Autonomy, the third characteristic, was a by-product of dispersion and nuclear lethality. Distance from higher headquarters or loss of that headquarters required greater autonomy of subordinate commanders. Use of tactical nuclear weapons could create or close windows of opportunity, allowing only limited reaction time.[7] Subordinate unit commanders had to have a clear understanding of their commander's intent. Commanders had to practice decentralized command and control and use mission-type orders.[8]

Finally, the US Army had to remain flexible and possess a "dual capability."[9] The Army had to be able to react to other battlefield scenarios as well as the nuclear battlefield. The nuclear battlefield pitted the US against a Soviet foe in western Europe. Any US Army unit placed on that battlefield had to be able to accomplish its mission given expected nuclear strikes, mass casualties, and extensive destruction. On the

other hand, these same units had to be strategically deployable to all parts of the world and fight so called "brushfire wars." These conflicts might pit the US Army against Soviet-backed insurgents or Third World conventional forces. Any unit designed for the nuclear battlefield had to be able to "switch hit" and function effectively on other kinds of battlefields.

Aspects Which Caused Concern

Two aspects caused concern for most commanders. First, was the need to balance dispersion and concentration. The second was the need to balance protection with control.

In the defense, commanders had to concentrate sufficient combat power to force the enemy to mass and then be targeted by US nuclear strikes, without causing the forces to become targets themselves.[10] Similarly, in the offense, forces had to remain dispersed, move through the "vacuum areas" left by nuclear strikes, and exploit the enemy's logistical areas.[11] The basic problem was one of "dispersed concentration."[12] Dispersion was necessary for reducing vulnerability to nuclear strikes, yet concentration was also necessary to complete the destruction of the enemy and to make maneuver decisive in the enemy's eyes.

The second aspect which concerned commanders was the need to balance protection with control. Units had to remain dispersed for protection against nuclear strikes, yet commanders still had to control the readiness of the unit to attack or defend. Dispersion required extending the breadth and depth of the battlefield. The distance between subordinate units could hide or mask the overall unit signature and decrease the probability of being targeted by enemy nuclear weapons. At the same time, this separation distance drastically affected the commander's ability to control all of his subordinate units. Long-distance communications links, accelerated information flow, and mission-type orders were some of the methods attempted to diminish the commander's control problem.[13]

Requirements for Successful Operations

Successful operations on the nuclear battlefield would require sophisticated intelligence systems, swift maneuver speed, and units that could fight nuclear as well as non-nuclear battles.

Corps and division-sized units required an integrated battlefield area surveillance system that could collect, correlate, and disseminate targeting information.[14] The extended breadth and depth of this battlefield required increased reliance on electronic

intelligence systems. These systems had to provide information about areas left vacant by force dispersion. Additionally, these systems had to be able to take intelligence from many sources and paint a usable picture for the commander. Finally, the system had to be able to distribute electronically the information to subordinate commanders.

Units operating on this wide-open, fluid battlefield required superior tactical mobility.[15] This requirement spurred the development of armored personnel carriers and helicopters. These armored vehicles could provide a limited amount of protection against nuclear strikes and greater tactical mobility than wheeled vehicles and could allow units to maneuver closer to radioactive areas. Planners saw the helicopter as a solution to many nuclear battlefield problems, because it could furnish swift tactical movement. They could also alleviate the supply distribution problem on a battlefield where land lines of communication might be disrupted.

The final requirement for successful operations on the nuclear battlefield was unit flexibility. This required units to be able to fight on the nuclear battlefield as well as conventional wars. The Army could not afford to maintain two separate combat forces. This "dual capability" posed many

organizational problems. The organizational fixes for firepower, protection, and maneuver problems on the nuclear and conventional battlefield were different. Tactics, command and control, strategic deployability, and other facets of the US Army were affected by this flexibility requirement.

The nuclear battlefield of the Pentomic Era came about from technology's dramatic increase in firepower. This instantaneous mass destruction was a significant issue and its impact on the US Army was hotly debated by US officers between the Korean and Viet Nam Wars. On the other hand, the nonlinear battlefield was not "created" in such a dramatic and discernible fashion.

The Nonlinear Battlefield

Factors Causing Change

Politics, both foreign and domestic, and technology forced the US Army to shift its focus from a Euro-centric, echeloned battlefield to a global, nonlinear battlefield. Arms control negotiations with the former Soviet Union in the late 1980's and the collapse of that government contributed to downsizing trends, which had already been started by domestic fiscal reality. The result of these influences was a reduction in US troop density and a shift in focus away

from the western European battlefield and monolithic Soviet threat to a more regional and global outlook.[16]

Lower US troop density does not necessarily mean lesser capability. Technology has enhanced intelligence gathering, target acquisition, terminal lethality, and mobility of US forces. This, combined with the proliferation conventional and unconventional weapon systems to Third World countries, bring about the nonlinear battlefield.[17]

Battlefield Description

A Combined Arms Center study defined the nonlinear battlefield as:

> A battlefield upon which the commander, either by choice or the lack of maneuver forces to cover all the terrain, has placed his forces in dispersed, noncontiguous areas from which he can operate to destroy enemy forces within his area of operations.[18]

This definition requires three factors: force dispersion, high lethality, and rapid tempo.

Nonlinear battlefields will be characterized by large gaps between units. Unit flanks will normally not be tied in with adjacent units. Units may have 360 degree orientations to maintain security. The increased breadth and depth of the battlefield means that the concept of a "front" and "rear" will lose significance.

Old and new technologies will meet on this battlefield to create a very lethal environment.

Ballistic missiles with nuclear, chemical, or biological warheads are already in the hands of potential enemies. The spread of armored and mechanized vehicles, despite arms control negotiations, confronts our new long-range conventional firepower technology. When combined, these technologies could likely create a battlefield of both mass and precision destruction.

Operations on this nonlinear battlefield will be conducted at a rapid tempo. Forces will have to remain dispersed in order to protect themselves from enemy long-range attack. Forces must then mass and fight short battles of destruction, and later disperse and prepare to fight again.[19]

Aspects Which Caused Concern

Successful US Army operations on the nonlinear battlefield will allow commanders to obtain victory in a shorter amount of time and with fewer casualties.[20] But certain aspects of the nonlinear battlefield concern Army leaders today: extended command and control, the ability to conduct linear and nonlinear operations, and combat service support on a nonlinear battlefield.

As to the first concern, force dispersion will cause command and control to be stretched over greater distances and over an electronic medium vulnerable to

enemy disruption. This will place a greater premium on leader initiative and unit agility.

For a variety of reasons, US forces may be required to conduct traditional linear-type operations, but the goal is to create nonlinear conditions where we have a technological advantage.[21] Political considerations, mission, terrain, and enemy threat may require parts of the force to conduct linear operations. Our forces must be organized and trained to conduct both types of operations. Requiring our military to be this flexible could degrade its performance in one or both types of operations.[22]

Logistic operations on the nonlinear battlefield may require a break with the traditional threat-free, ground line of communication. The preponderance of combat service support (CSS) operations are conducted in non-armored wheeled vehicles traveling between "rear" and "front" areas with little or no combat threat in between. Just how CSS units will operate over longer distances and in threat-contested or uncontrolled areas remains to be seen.[23]

Requirements For Successful Operations

Creating the conditions for successful US Army operations will require greater reliance on the efficacy of intelligence systems, increased maneuver

orientation of all US Army units, and expanded emphasis on subordinate commanders' initiative.[24] Intelligence systems will have to look deep and span the gaps between dispersed units. Combat, combat support (CS), and CSS leaders must all begin consider maneuvering forces, fires, and supplies and services to shape and condition the battlefield. Finally, successful operations will require that commanders clearly articulate their intent, ensure subordinate commanders understand it, resource their subordinates to accomplish it.

Table I summarizes both battlefield descriptions.

Table I. Battlefield Description Summary

	NONLINEAR	NUCLEAR
Cause	Politics Technology Wpns Spread	Tactical Nuc Wpns
Description	Dispersion Lethality Tempo	Dispersion Mobility Autonomy Flexibility
Cause for Concern	Extended C2 Linear & Nonlinear CSS Synchronization	Disperse/Concentrate Protect/Control
Requirements for Successful Operations	Intell Systems Maneuver Initiative	Intell Systems Speed Conventional & Nuclear Ops

II. ANALYSIS AND EVALUATION

As mentioned in the introduction, the reason for proving similarity between the nuclear and nonlinear battlefields is to provide insights and analysis efficiencies to combat developments for the nonlinear battlefield. If I can prove their similarity, the test and analysis data from the Pentomic Era could be used as a point of departure to analyze the nonlinear battlefield and add to our doctrinal understanding of the future.

The preceding section described both battlefields. This section analyzes both battlefields in terms of three test criteria. After defining my test criteria, I will compare and contrast the different battlefields by providing the following: nonlinear battlefield evidence, nuclear battlefield evidence, and analysis of both.

Battlefield Characteristics

The first test criterion is Battlefield Characteristics. These characteristics come from key descriptive aspects found in the literature describing both battlefields: lethality, dispersion, mobility, and fluidity.

Lethality

Lethality on the nonlinear battlefield is a result of friendly and enemy proliferation of nuclear, biological, chemical, and high-technology weapon systems. The proliferation of these types of lethal technologies has increased the potential for mass destruction, even in globally peripheral combat.[25] The technology to acquire and strike long-distance targets strips the "rear" of its long-cherished safety, making it another part of the "front." Mass use of precision-guided munitions places all battlefield units at risk of destruction. Additionally, the nonlinear battlefield places greater emphasis on enemy destruction rather than terrain retention.[26] Against an enemy of similar capability, the US Army could find itself locked in an indecisive battle of attrition as each side looks to complete the long-range destruction of the other through close combat.

On the nonlinear battlefield, many countries could field lethal armies, but it was the Soviet development of tactical nuclear weapons that concerned the US Army almost forty years ago. The advent of tactical nuclear weapons increased firepower effects one thousand fold.[27] Their significance to the battlefield was increased attrition, rather than enemy suppression.[28]

After a unit reached a certain level of concentration, it could be acquired, struck by nuclear weapons, and completely destroyed. The lethal aspects of this battlefield so concerned US Army leaders that they thought protective measures would dominate US Army tactics and unit organizational structure.[29]

Swift enemy destruction was a concern in the Pentomic Era and it remains so today, even though its ways and means are different. Fifty years ago, nuclear cannons were the epitome of tactical destruction. The US Army also developed short and intermediate-range nuclear missiles. The USSR was the only opponent who could match this lethal arsenal. Today, nuclear, chemical, and biological weapons are proliferating among Third World nations. Industrialized nations compete with each other for a share in the "lethality market." Smart and brilliant munitions have increased the efficiency of conventional weapons systems. Today's technology can approach the destruction capability envisioned during the Pentomic Era. The only difference between today and the past is the time needed to attain the desired levels of destruction.[30]

Dispersion

Dispersion is the second Battlefield Characteristic. On the nonlinear battlefield,

dispersion provides force protection and freedom of action. As discussed in the nonlinear battlefield description, dispersion provides a measure of protection against enemy target acquisition means by reducing unit signature. It also reduces unit vulnerability to long-range attack.[31] Dispersion becomes the characteristic countermeasure to the high levels of destruction described in the preceding paragraphs.

Freedom of action comes from a unit's ability to create the effects of mass from dispersed locations without telegraphing its intentions.[32] Remaining dispersed denies the enemy information about friendly intentions. Long-range strike systems can range throughout the depth of the battlefield, giving dispersed units the ability to mass firepower effects at selected points or on designated enemy formations.

On the nuclear battlefield, dispersion minimized the effects of enemy nuclear strikes, but caused a "zone of interpenetration."[33] Dispersion did not mean wide spacing between men and combat systems; this would adversely affect the commander's ability to control the unit. Dispersion normally meant wide separation between battalion-size units.[34] At this echelon, dispersion prevented any single tactical nuclear strike from rendering the regiment or battle group combat

ineffective. On the nuclear battlefield, battalions moving as part of dispersed regiment or battle group gave it a "granular form."[35] Combat between enemy and friendly units would be conducted in a deep zone of interpenetration, where front and rear would lose meaning. The only ground controlled was the ground that was occupied by a unit. As B.H. Liddell Hart described it, dispersion was little groups, creating multiple effects, while not offering any concentrated targets.[36]

Common to both battlefield descriptions, dispersion is a consequence of lethal technology. Dispersion was a method to reduce vulnerability to target acquisition and attack on both battlefields. Additionally, dispersion placed greater stress on leaders and more reliance on subordinate commander initiative,[37] which is common to both battlefields and will be addressed later.

Mobility

The third Battlefield Characteristic, mobility, is characterized by protection, maneuver, and tempo. If a unit is detected on the nonlinear battlefield, system and unit mobility break the enemy's detection lock. Secondly, units must be able to maneuver rapidly from dispersed locations to obtain a positional advantage over the enemy and to complete his destruction.[38]

Finally, increasing the mobility capability of CS and CSS and of command and control allows a much faster operational tempo and places the enemy at a significant disadvantage.[39]

Along the same lines, mobility on the nuclear battlefield had both protection and maneuver traits. Continuous movement provided a measure of passive protection against enemy nuclear strikes.[40] Additionally, mobility allowed rapid convergence to friendly nuclear strike locations to exploit the effect of these fires.

The mobility characteristic has commonality between both battlefield descriptions. Protection and rapid maneuverability are key to both the nonlinear and nuclear battlefield. However, mobility on the nonlinear battlefield is extended to include combat, CS, CSS, and command and control. This broader notion of mobility accelerates operational tempo and would allow US Army units to outpace the enemy on a modern battlefield.

Fluidity

Fluidity is the final Battlefield Characteristic. Fluidity is the lack of familiar battlefield geometry common to linear structured battles. On the nonlinear battlefield forward line of own troops (FLOT), boundaries, and front and rear areas lose distinction

and relevance. Dispersion, rapid movement, and short windows of opportunity preclude such static control measures. Over time, the term "more open, less structured" has become synonymous with nonlinear. It is this less-defined battlefield geometry that gives the battlefield its nonlinear nature.[41]

Within the nuclear battlefield's zone of interpenetration, boundaries became irrelevant and units were required to orient 360 degrees. Intermingling of friendly and enemy units in this zone caused familiar control measures to lose their significance.

This is nearly the same problem as described in the previous paragraph about the nonlinear battlefield. However, the scope of the problem was different. On the nonlinear battlefield, the entire area could conceptually lack familiar definition. On the other hand, only the nuclear battlefield's zone of interpenetration excluded some aspects of familiar battlefield geometry.

Battlefield Relationships

The second test criterion is Battlefield Relationships. These relationships describe the interaction between and among battlefield activities and forces. There are three relationships used in this

test criterion: tactical cycle, objective orientation, and sustainment sufficiency.

Tactical Cycle

The first relationship, tactical cycle, shows the relationship between battlefield events. TRADOC Pamphlet 525-5 lays out an "operational" cycle of four stages: Detection and Preparation, Establishing Conditions for Decisive Operations, Decisive Operations, and Force Reconstitution. This operational cycle was meant to focus both tactical and operational-level commanders on the operational-level of war objective.

TRADOC Pamphlet 525-5 did not include a tactical cycle. However, GEN John Foss, former TRADOC commander, described a tactical cycle in an article that preceded the pamphlet by eight months.[42] The nonlinear tactical cycle he described was: disperse, mass, fight, redisperse, and reconstitute.

Forces would be initially dispersed to reduce vulnerability to target acquisition and long-range precision guided munitions strikes. Commanders would move units along separate routes, massing forces and fires to quickly fight highly synchronized battles of destruction. After the fight, commanders would redisperse their units to gain security against target

acquisition, long-range strikes, and counterattack. Once this was accomplished, reconstitution operations would commence.

The tactical cycle for the nuclear battlefield contains many of the same words: disperse, move, mass, fight, re-disperse.[43] Forces disperse to reduce their signature and vulnerability. They then move along distributed routes and mass at the critical place and time. Forces then fight short, violent engagements. They then redisperse and the cycle continues.

Both tactical cycles look identical and to a large extent they are.[44] Both seek to reduce vulnerability by dispersing. Both seek to mass forces at the last possible minute and fight short battles. Finally, both would redisperse forces after the fight to maintain security and protection.

Objective Orientation

The second Battlefield Relationship is objective orientation. This is the relationship between friendly forces and the tactical objective. In keeping with the operational level of war focus, TRADOC Pamphlet 525-5 stresses that tactical objectives must contribute directly to the operational-level objectives of the Joint Force Commander or the senior US Army commander.[45] These tactical objectives will normally

orient on the enemy force rather than terrain.[46] However, situations may arise where terrain retention or capture may change this orientation.

On the other hand, nuclear battlefield literature showed that there was not a consensus on this point. A variety of sources showed different tactical objectives: force, terrain, and/or nuclear delivery means. In The Pentomic Era, A.J. Bacevich points out that the Korean War experience reemphasized a force orientation.[47] Theodore Mataxis points out in Nuclear Tactics, that the objective (as a control measure) would remain oriented on terrain or territory.[48] Finally, John Midgley in Deadly Illusions writes of a US Army War College Study (1954) that recommended traditional Armor and Infantry missions be scrapped. The missions were to be replaced by reconnaissance, nuclear weapon security, and destruction of enemy nuclear and chemical weapons.[49]

Clearly there is a difference in force orientation between the nonlinear and nuclear battlefields. While there is some commonality in focusing forces on enemy destruction, this part of the test criteria begins to hint at the sometimes confusing undertones of trying to build a dual capability army during the Pentomic Era.

Sustainment Sufficiency

The third and final Battlefield Relationship is sustainment sufficiency - the relationship between the fighting force and the sustainment force. Since the nonlinear battlefield places a high premium on mobility and lethality, early sustainment concept writers envisioned "unburdened" combat commanders. These concept developers wrote that CSS mobility reduced combat agility and that controlling CSS was a distraction and competed with maneuver for the commander's time.[50] GEN John Foss, a former TRADOC commander, felt that the maneuver division's logistic capability should be reorganized. Some capability would be pushed down to the brigade's Forward Support Battalion (FSB) and some would be pulled up to Corps within the Corps Support Groups.[51] This would unweight the maneuver division and make it more mobile and agile. Additionally, he thought the FSB ought to be organic to the maneuver brigade. This would gain a measure of self-sufficiency for the maneuver brigade.

TRADOC Pamphlet 525-5 does not make such specific recommendations as those proposed by Foss. However, the pamphlet does propose splitting the division's logistic capability between battalion and corps. This would reduce CSS layering, improve the tactical combat focus,

and increase unit effectiveness (due to reduced force levels).[52]

Much of the same rationalization was used thirty-five years ago about sustainment on the nuclear battlefield. The first principle of logistics in the Atomic Field Army (ATFA) was the centralization of logistic capability to relieve tactical combat commanders of the logistic "burden."[53] However, testing showed that dispersed combat operations prevented centralization from working efficiently at all echelons.[54] This is a key point. Logistic flexibility tended toward centralization, much the same as CS is centralized and given direct support missions. However, self-sufficiency pointed toward decentralized, independent logistic capabilities.[55] This aligns with GEN Foss's idea of making the FSB organic to the maneuver brigade.

Not surprisingly, planners of both battlefield concepts envisioned forces that were self-contained, self-sufficient, and that had high endurance. Where nuclear battlefield analysts affirmed the dynamics between flexibility and self-sufficiency, proponents of skip-echelon logistics on the nonlinear battlefield want to find a feasible balance between the two.

Combat Power Dynamics

The third and final test criterion is Combat Power Dynamics: maneuver, firepower, protection, and leadership. According to FM 100-5, Operations, combat power is the ability to fight and is created by combining maneuver, firepower, protection, and leadership.[56]

Maneuver

The first dynamic, maneuver, is the movement of forces relative to terrain to achieve an advantage over the enemy.[57] Tactical-level maneuver on the nonlinear battlefield relies more on bringing massed, close-combat firepower on the enemy from unexpected directions and ranges and less on occupying/using terrain for a transient advantage. Given the enemy force orientation already discussed, maneuver is a means of completing the destruction of the enemy.[58]

On the other hand, tactical maneuver on the nuclear battlefield was relatively "straight forward." Within the zone of interpenetration, flanking movements by enemy or friendly units would lose their relevance.[59] Using nuclear weapons, the penetration would become quick and easy. In The Pentomic Era, Bacevich points out that military planners emphasized penetrations and frontal attacks, because they

minimized command and control problems.[60] In fact, when combined with tactical nuclear firepower, maneuver would become "routine exploitation."[61]

The two battlefields require different maneuver strategies. On the nonlinear battlefield, forces seek the flanks and rear of the enemy and complete his destruction (begun by long-range precision munitions) through close combat. On the nuclear battlefield, however, US Army reliance on tactical nuclear weapons during the 1950's permitted simpler forms of maneuver.

Firepower

Firepower, the second dynamic, is the force that destroys the enemy's will and capability to fight.[62] On the nonlinear battlefield, commanders use firepower with maneuver. Long-range precision firepower can destroy significant portions of enemy forces long before they make contact with friendly forces. These same fires can cover gaps between units, and can establish conditions for completing the destruction of the enemy through maneuver.[63] On the nonlinear battlefield, corps and division commanders move long-range firepower effects around the battlefield, just as brigade and task force commanders bring close combat firepower to bear on the enemy.

On the other hand, firepower was clearly dominant in planning for the nuclear battlefield. Tactical nuclear weapons increased firepower effects one thousand-fold. However, science had not provided the requisite increase in mobility. Therefore, as Mataxis pointed out, maneuver was dependent on firepower.[64] A much more radical point of view was held by GEN Willard Wyman. In 1958, he was the commander of the Continental Army Command. In the March 1958 issue of Military Review, he wrote that "tactical firepower alone can now accomplish the purpose of maneuver."[65]

Both battlefield concepts acknowledge the great lethality of firepower, yet the relationship of firepower to maneuver differs in each. On the nonlinear battlefield, firepower and maneuver are interdependent. However, on the nuclear battlefield, firepower in the form of tactical nuclear weapons was the sine qua non of combat power.

Protection

Protection, the third dynamic, is defined by FM 100-5 as efforts to conserve the fighting force so that it can be used at the decisive place and time.[66] On the nonlinear battlefield, commanders gain protection for their units through security, reconnaissance, and dispersion.[67] Security from ground and air attack would

be provided by ground and air cavalry forces, theater ballistic missile defenses, and counter RISTA forces. Electronic sensors and cavalry forces provide protection by maintaining contact with the enemy and by giving warning time to friendly forces. But the key component of protection on the nonlinear battlefield is dispersion. Forces must remain dispersed to minimize their electronic, thermal, and physical signature. This in turn reduces their vulnerability to long-range detection and attack.

Unit commanders on the nuclear battlefield had to gain protection through active and passive measures designed to limit the destructive effects of enemy nuclear strikes. Paramount among the active measures was dispersion. On the nuclear battlefield, dispersion prevented presenting a target worth striking with an nuclear weapon. Other active measures also included greater emphasis on reconnaissance and countering the enemy's reconnaissance.[68]

Protection from firepower, long-range precision weapons or tactical nuclear weapons, contained about the same components on both battlefields. On both battlefields, dispersion was the key aspect or protection. Dispersion sought to hide valuable units behind a cloak of separation and distance. Both concepts also saw the utility of knowing where the

enemy force was located and of stripping the enemy of his own reconnaissance forces.

Leadership

The final combat power dynamic is leadership. Leadership provides purpose, direction, and motivation to the force.[69] It is this component of direction which warrants exploration.

On the nonlinear battlefield, dispersion, lethality, and tempo create fog and friction against clear direction in situations where initiative is constantly required. Mission tactics and mission-type orders are listed by TRADOC Pamphlet 525-5 as part of the solution.[70]

Interestingly enough, mission-type orders were also seen by many as part of the solution to the same problem on the nuclear battlefield. Dispersion and lethality meant that subordinate commanders might have to operate for prolonged periods without guidance from higher headquarters. This lesser degree of control had to be buttressed by a stronger direction mechanism. That mechanism consisted of mission-type orders and clearer concepts of the operation.[71] Mission-type orders would give subordinate commanders the latitude

Table II. Test Criteria Summary

	NONLINEAR	NUCLEAR	SIMILAR
Characteristics			
Lethality	NBC, Tech, Mass PGM	Sov Tact'l Atm Wpns	Yes
Dispersion	Protection, Freedom of Action	Protection	Yes
Mobility	Protection, Maneuver tempo	Protection, Maneuver	Yes
Fluidity	More open, less structured	Interpenetration Zone	Partial
Relationships			
Tactical Cycle	Disperse, mass, fight, redisperse, reconstitute	Disperse, move, mass fight, redisperse	Yes
Obj Orientation	Enemy	Enemy, terrain, enemy atm wpns	Partial
Sustainment Sufficiency	Unweighting, self-sufficiency	Unweighting, self-sufficiency	Yes
Dynamics			
Maneuver	Flank,rear,complete enemy destruction	Front, penetrate min control problems	No
Firepower	Firepower/maneuver	Dominate maneuver	No
Protection	Dispersion, recce, counter-RISTA	Dispersion, recce, counter-RISTA	Yes
Leadership	Mission tactics mission orders	Mission orders	Yes

to act on their own initiative to accomplish the mission. Clearer concepts of the operations would give subordinate commanders a better picture of how they contributed to the overall success of the mission.

Both battlefield concepts recognize the importance of subordinate commander initiative. Writers of both periods hit on mission-type orders as the mechanism for directing this initiative. Clearly, the effects of dispersion, high lethality, and rapid tempo caused similar problems and required similar solutions.

Research Question Answer

Is the nuclear battlefield of the Pentomic Era similar to the nonlinear battlefield postulated in TRADOC Pamphlet 525-5? In my methodology of comparison and contrast using three test criteria containing eleven sub-parts, seven sub-parts indicate clear similarity, two sub-parts show partial similarity, and two sub-parts are qualitatively different (See Table II). The evidence contained in this monograph affirms that the nuclear battlefield is qualitatively similar to the nonlinear battlefield.

The counter-argument that the nonlinear and nuclear battlefields are not similar rests in the fact that both concepts arose from different causes and thus are qualitatively different.

The nonlinear battlefield is caused by world-wide reductions in troop density, technologically enhanced capability of units (both friendly and opposing), and a shift in planning focus from central Europe to a global perspective.[72] These factors bring about the salient features of the nonlinear battlefield: unit dispersion, high lethality, and rapid tempo.

On the other hand, tactical nuclear weapons of the late 1950's were the dominant influence on shaping the nuclear battlefield. There was no historical precedent and senior army commanders felt that efforts to survive tactical nuclear strikes would significantly influence doctrine and tactics. Additionally, the nuclear battlefield concept focused on western European forces facing a similarly equipped Soviet threat.[73] The nonlinear battlefield perspective looked globally, while the nuclear battlefield looked at a specific theater of operations.

Another difference is the nature of dispersion. The nonlinear battlefield is often described in terms of noncontiguous boundaries between units and no FLOTs. Some Pentomic Era authors believed that tactical nuclear weapons would force a linear dispersion. For instance, F. O. Miksche in his work, Atomic Weapons and Armies, believed that on the nuclear battlefield, a

formation dispersed linearly would still provide the required protection without giving up control.[74] Another author, Thornton Read, wrote that nuclear weapons would render mass obsolete and possibly drive tactics back to those of static positions versus those of maneuver.[75]

Despite these differences, I maintain that though the causal factors are dissimilar, the requirements for dispersion, lethality, and mobility are qualitatively the same for each battlefield description.

Interestingly enough, Soviet military analysis of these two battlefields also supports an affirmative answer to the research question. According to Soviet future concept writers:

> combat has become exceptionally dynamic and highly maneuverable, forcing subunits to change rapidly from attack to defense and back again and to change frequently its combat formation. The attack will develop extremely irregularly with the absence of a continuous front line and will be conducted in wider zones along axes. Under these conditions, combat will have a fragmented, nonlinear nature at the various troop echelons.[76]

Since the mid 1980's, Soviet military analysts have watched precision-guided munitions and other technological innovations and their effects on the battlefield.[77] Their literature describes the future battlefield in terms of high lethality and nonlinearity.[78] Their view sounds quite similar to the

view postulated by TRADOC Pamphlet 525-5 and other documents. For instance, the Soviet vision of the battlefield uses terms such as: absence of well-defined spatial limits; increased demand for mobility, maneuverability, and flexibility at tactical levels; decentralized conduct of close-range maneuver; and higher requirements for information systems to orchestrate fragmented combat.[79]

Soviet Military analysts have also equated heavy use of precision guided munitions to the destructive effects of tactical nuclear weapons.[80] The results of the 1991 Gulf War was conclusive evidence as far as these analysts were concerned.[81] Additionally, the Soviets have gone another step in their analysis and directly tied their vision of the future battlefield to their own past concepts of the nuclear battlefield. In fact, they are revisiting some of their own nuclear battlefield maneuver concepts because they may provide insight into tomorrow's nonlinear battlefield.[82] The fact that the Soviets are reviewing "anti-nuclear" tactics as possible solutions to nonlinear battlefield problems lends considerable weight to my argument.

III. CONCLUSION

This paper has demonstrated that the nuclear battlefield of the Pentomic Era is qualitatively similar to the nonlinear battlefield postulated in TRADOC Pamphlet 525-5. The significance of this similarity lies in the testing, analysis, and actual employment data that exists for units that were designed to fight on the nuclear battlefield.[83] Some of the issues that Army senior leaders struggled with during that time were: level of combined arms integration, logistics on a dispersed battlefield, strategic deployability, tactics, command and control, flexibility (unit nuclear and conventional capability), and skip-echelon logistics. These issues closely parallel major issues listed in TRADOC Pamphlet 525-5. Data from the Pentomic Era could be used by military analysts and others to gain insights and analysis efficiencies as they investigate similar issues concerning the nonlinear battlefield.

The study of military history in this case can provide a time, cost, and idea short-cut to examining the nonlinear battlefield. As Thornton Read pointed out in 1964 in his paper, "The Nuclear Battlefield in Historical Perspective",

> The value of military history has always been that, by providing a broad base of experience, it tends to correct a viewpoint

> too closely tied to a particular experience. The greater the variety of experience we have learned to understand, the more likely we are to cope successfully with still newer developments.[84]

At issue is not whether the nonlinear battlefield concept is accepted and codified in doctrine and tactics. The nuclear battlefield concept had little impact on US Army doctrine compared to the destructive potential of tactical nuclear weapons.[85] However, the US Army spent considerable time and effort in numerous tests (SAGEBRUSH, Oregon Trail, Blue Bolt, Desert Rock, and others) and conferences struggling with doctrine, organizations, materiel, training, and leader and soldier development issues of that period. My hope is that by showing the close resemblance between these two battlefield descriptions, efficiencies in analysis, testing, insight, and direction can be gained by those controlling the future US Army.

ENDNOTES

1. Wilbur M. Brucker. Military Review. (Jan 1958):30.

2. US Army. TRADOC Pamphlet 525-5 AirLand Operations - A Concept for the Evolution of AirLand Battle for the Strategic Army of the 1990's and Beyond. (Ft Monroe, VA: Training and Doctrine Command, 1991), 9.

3. TRADOC Pamphlet 525-5, forward.

4. US Army, FM 100-30 Tactical Nuclear Operations (Washington, DC: Department of the Army, 1971 [Obsolete 1978]), 2-2.

5. A.J. Bacevich, The Pentomic Era (Washington, DC: National Defense University, 1986): 49.

6. Three of these battlefield characteristics: dispersion, mobility, and flexibility come from Bacevich, pg 70. Autonomy is a fourth characteristic that was mentioned frequently in the literature of the period.

7. C. D. Eddleman, "Men, Missiles, and Atomics on the Future Army Battlefield," Army (Dec 1956): 28.

8. James M. Sheperd, "Type Divisions for Atomic Warfare," Military Review (Nov 1956): 24.

9. Sheperd, 24.

10. Lewis C. Taynton, "Impact of Atomic Weapons on Defense," Military Review (Sept 1956): 51.

11. G.C. Reinhardt and W.R Kintner, Atomic Weapons in Land Combat (Harrisburg, Pa: Military Publishing Service, 1953): 50.

12. F.O Miksche, Atomic Weapons and Armies (New York: Praeger, 1955): 155.

13. Cushman, 22.

14. Eddleman, 28.

15. Reinhardt and Kintner, 31.

16. Sources for determining the causal factors of the nonlinear battlefield can be found in any number of sources. TRADOC Pamphlet 525-5, 9; Stephen Silvasy,

"AirLand Battle-Future: The Tactical Battlefield," Military Review (Feb 91):3; John Foss, "AirLand Battle-Future: The Advent of the Nonlinear Battlefield," Army (Feb 91): 21; Norman R Augustine, "The Future of the US Army - Outlook for the 1990's," Background Briefs - Summaries of Guest Speakers Presentations to Members of Congress and their Staffs (April 90), Institute of Land Warfare, Association of the United States Army.

17. John W. Foss, "AirLand Battle-Future: The Advent of the Nonlinear Battlefield," Army (Feb 91): 21.

18. US Army Combined Arms Center (CAC), "Nonlinear Considerations for AirLand Battle-Future," Draft Paper, (Ft Leavenworth, KS 11 June 1990) Combined Arms Reference Library (CARL) N-19813.72, 5.

19. Foss, "AirLand Battle-Future: The Advent of the Nonlinear BAttlefield," 21 and CAC, "Nonlinear Considerations for AirLand Battle-Future," 5.

20. Silvasy, "AirLand Battle-Future: The Tactical BAttlefield," 9.

21. TRADOC Pamphlet 525-5, 13.

22. TRADOC Pamphlet 525-5, 34.

23. Foss, 22-23.

24. TRADOC Pamphlet 525-5, 13-15; Foss, 37.

25. TRADOC Pamphlet 525-5, 9.

26. TRADOC Pamphlet 525-5, 15.

27. Miksche, 17.

28. Thornton Read, "The Nuclear Battlefield in Historical Perspective," (Draft Paper, Bell Telephone Laboratories, Inc: New Jersey, Aug 1964) CARL N-18598.13, 24.

29. FM 100-30, 2-2.

30. This idea will be further developed later in the paper; however, to the best of my knowledge, only the former Soviet Union has made this connection and developed the idea. One particular source is Foreign Military Studies Office (FMSO), "The Nonlinear Nature of Future War: A Soviet/Commonwealth View," (Issue

Paper #5, US Army CAC, Ft Leavenworth, KS: March 1992), 8.

31. TRADOC Pamphlet 525-5, 22.

32. Silvasy, 5.

33. Read, 9.

34. Lewis C. Tayncon, "Impact of Atomic Weapons on Defense," Military Review (Sept 1956): 53.

35. Read, 9.

36. B. H. Liddell Hart, "New Warfare - New Tactics," Marine Corps Gazette (Oct 1955): 13.

37. Bacevich, 104 and TRADOC Pamphlet 525-5, 37, 41, and 43.

38. TRADOC Pamphlet 525-5, 22.

39. TRADOC Pamphlet 525-5, 30 and 37.

40. Dale D. Hogoboom, "Impact of Atomic Weapons on Offensive Operations," Military Review (Nov 57): 46.

41. William C. Rittenhouse, "Fire Support on the Nonlinear Battlefield: The Shape of Things to Come," Field Artillery (Oct 1990): 36. Another example of this less defined battlefield geometry is "Nonlinear Considerations for AirLand Battle Future." This document describes four different areas of the battlefield, each associated with different activities. Page six of this document states that these areas can overlap, expand, contract, move, or change direction or orientation.

42. Foss, 23.

43. Hogoboom, 46.

44. The tactical cycles look similar, even if different words are used. One early version of a TRADOC headquarters briefing on the nonlinear tactical cycle used: Find, Fix, Fight, Finish, and ReFit. This is remarkably similar to the cycle Mataxis uses in his book, Nuclear Tactics, 160: Find, Fix, Fight, Finish.

45. TRADOC PAmphlet 525-5, 14.

46. TRADOC Pamphlet 525-5, 15; see also, Rittenhouse, 37; "Nonlinear Considerations for AirLand Battle Future," 5; and Kent Steen, "AirLand Battle Future," Marine Corps Gazette (Mar 1991): 46.

47. Bacevich, 57; FM 100-30, 2-2, states that the primary mission in nuclear war is to destroy the enemy's capability to conduct offensive operations.

48. Mataxis, 165.

49. John J. Midgley, Deadly Illusions: Army Policy for the Nuclear Battlefield (Boulder CO:Westview Press, 1986): 39.

50. Foss, 34.

51. Foss, 35.

52. TRADOC Pamphlet 525-5, 38.

53. Edgar L. Shriver, SAGEBRUSH Maneuver Tests: Applied and Theoretical Department of the Army, DTIC # AD A0722710-1 (Alexandria, VA: Human Resources Research Organization, 1956): Appendix B, 8.

54. Shriver, 8.

55. Read, 54.

56. U.S. Army, FM 100-5, Operations (Washington, DC: Department of the Army, 1986): 11.

57. FM 100-5, 12.

58. Mark M. Rose, "The Nonlinear Battlefield," (Unpublished paper presented during Doctrine Video Teleconference, 28 Feb 1991 at HQ TRADOC, Ft Monroe, VA.): 2.

59. Bacevich, 109.

60. Bacevich, 110.

61. Read, 3.

62. FM 100-5, 12.

63. Rittenhouse, 37.

64. Mataxis, 125.

65. Willard G. Wyman, "The United States Army: Its Doctrine and Influence on US Military Strategy," Military Review (Mar 1958): 10.

66. FM 100-5, 13.

67. TRADOC Pamphlet 525-5, 16 and 24; see also Foss, 36.

68. Both Mataxis, 83, 94-98 and Shriver, Appendix B, 3 talk about protection in terms of dispersion, reconnaissance, and counter-reconnaissance. They also list other active and passive measures.

69. FM 100-5, 13.

70. TRADOC Pamphlet 525-5, 35.

71. Hogoboom, 45.

72. TRADOC Pamphlet 525-5, 9 and 15.

73. Mikshe, 19.

74. Mikshe, 140.

75. Read, 41.

76. Lester W. Grau, "Soviet Non-Linear Combat: The Challenge of the 90's," (Ft Leavenworth, KS: Foreign Military Studies Office, 1990): 2.

77. Foreign Military Studies Office, "The Non-Linear Nature of Future War: A Soviet/Commonwealth View," Issue Paper No. 5 (Ft Leavenworth, KS: CAC, 1992): 3.

78. Lester W. Grau, "Continuity and Change: A Soviet General Staff View of Future Theater War," Military Review (Dec 1991): 14.

79. Issue Paper No. 5, 8.

80. Milan Vego, "Recce-Strike Complexes in Soviet Theory and Practice," Foreign Military Studies Office (Ft Leavenworth, KS: CAC, 1990): 1. See also, Jacob Kipp, "The Evolution of Soviet Operational Art: The Significance of Strategic Defense and Premeditated Defense in the Conduct of Theater-Strategic Operations," Foreign Military Studies Office (Ft Leavenworth, KS: CAC, 1991): 13. and Grau, "Challenge and Continuity," 11.

81. Issue Paper No. 5, 8.

82. Grau, "Soviet Non-Linear Combat," 3.

83. Roger J. Spiller, "Not War, but Like War": The American Intervention in Lebanon (Command and General Staff College: Ft Leavenworth, KS, 1981). Dr Spiller recounts the US intervention in Lebanon in 1958. The US Army combat elements came from Pentomic Divisions in Europe. Though the book focuses on contingency operations and not Pentomic Era tactics or organizations, it does describe some of the deployment and employment shortcomings of Army forces.

84. Read, 2.

85. Midgley, 40. Deadly Illusions provided an interesting view of how the US Army struggled with the nuclear battlefield concept. Caught between classified information and difficult test parameters, doctrine ended up being a product of consensus building. As such, there never really was a tactical nuclear doctrine for that period of time. A review of Field Service Regulation 100-5, Operations for the period 1954-1962 bear this out. The 1962 version of FM 100-5 has the most to say about the nuclear battlefield. Pages 59-61 discuss battle conducted with limited numbers of tactical nuclear weapons. This sections echoes Pentomic Era literature on dispersion, mobility, and tempo.

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